

DSA323B QUENCH HISTORY

To remind you all, DSA323 displayed unusual quench behavior (i.e. down ramp quench after exceeding 7kA many times without quenching), during previous tests. Recently this magnet was reassembled with Aluminum end can, +5/-5 mil inner/outer pole shims were added and intermediate keying method was used in collar assembly. The average prestress on inner coils was doubled (from 5880 to 11500 psi) and it was reduced for outer coils (from 9940 to 5530 psi). After making these changes, DSA323 was cold tested and it did not experience any down ramp quenching. To ramp the magnet we used similar sawtooth ramps as before (Fermilab TS-SSC 91-094) and successfully completed 10 ramp cycles between 50 - 7200 A (at 25 A/s), and same number of ramp cycles (10) at 100 a/s, between 50 - 7000A with 60 sec dwell at peak current, were also completed without quenching the magnet. The exact cause of downramp quenching is not clear. It could be because of either end clamp or lower coil prestress. One can safely say that proper assembly of a magnet is the key to its satisfactory performance. The quench summary for the latest cold test is given below.

Quench File Summary

DSA323

Q#	File	I-m	Idot	I-t	Idot	QDC	MIITs	t-Q	V-max	Coil	t(H)	V(H)	T(t)	T(m)	T(b)	P	LL	Location
	243	1013.	0.	0.0	0.0	V-dI	0.0	0.000	-6.	UI	0.000	0.	4.36	4.32	4.32	867.	58.	Manual Dump to check s. ckts
1	244	8610.	0.	0.0	0.0	U-L	0.0	-0.018	-38.	UI	0.000	0.	4.36	4.32	4.32	870.	73.	OU near vtap 20A
2	245	8889.	16.	0.0	0.0	U-L	0.0	-0.016	-39.	UI	0.000	0.	4.36	4.32	4.32	864.	77.	OU near vtap 20A
3	246	7035.	16.	0.0	0.0	U-L	0.0	-0.017	-38.	UI	0.000	0.	4.36	4.32	4.32	863.	76.	OU near vtap 20A
4	247	7177.	16.	0.0	0.0	U-L	0.0	-0.015	-32.	UI	0.000	0.	4.35	4.31	4.31	862.	76.	OU near vtap 20A
5	248	7261.	16.	0.0	0.0	U-L	0.0	-0.016	-37.	UI	0.000	0.	4.36	4.32	4.32	867.	77.	OU near vtap 20A
6	249	7324.	16.	0.0	0.0	U-L	0.0	-0.014	-38.	UI	0.000	0.	4.35	4.31	4.32	860.	71.	OU near vtap 20A
7	250	7412.	16.	0.0	0.0	U-L	0.0	-0.015	-37.	UI	0.000	0.	4.35	4.31	4.31	862.	74.	OU near vtap 20A
8	251	7437.	16.	0.0	0.0	U-L	0.0	-0.014	-38.	UI	0.000	0.	4.36	4.32	4.32	866.	73.	OU near vtap 20A
9	252	7476.	16.	0.0	0.0	U-L	0.0	-0.011	-32.	LI	0.000	0.	4.36	4.32	4.31	866.	66.	IL19SR, 23(9)ms from 20A(19C)
10	253	7476.	16.	0.0	0.0	U-L	0.0	-0.010	-29.	LI	0.000	0.	4.36	4.32	4.31	864.	73.	IL19SR, 22(8)ms from 20A(19C)
11	254	7476.	16.	0.0	0.0	U-L	0.0	-0.011	-29.	UI	0.000	0.	4.36	4.32	4.32	867.	69.	IU19SR, 5(10)ms from RSPL(19C)
12	255	7481.	16.	0.0	0.0	U-L	0.0	-0.011	-29.	LI	0.000	0.	4.37	4.31	4.32	871.	73.	IL19SR, 15(8)ms from 20A(19C)
13	256	7486.	25.	0.0	0.0	U-L	0.0	-0.010	-28.	UI	0.000	0.	4.36	4.32	4.32	862.	72.	IU19SR, 4(10)ms from Rsp1(19C)
14	257	7491.	50.	0.0	0.0	U-L	0.0	-0.010	-27.	UI	0.000	0.	4.37	4.33	4.33	867.	71.	IU19SR, 12(3)ms from Rsp1(19C)
15	258	7510.	75.	0.0	0.0	U-L	0.0	-0.009	-25.	UI	0.000	0.	4.36	4.32	4.32	863.	66.	IU19SL, 4(5)ms from 19C(18B)
16	259	7486.	100.	0.0	0.0	U-L	0.0	-0.008	-23.	LI	0.000	0.	4.39	4.35	4.34	881.	70.	ILM multiturn ~vtap 13A
17	260	7368.	150.	0.0	0.0	U-L	0.0	-0.017	-29.	LI	0.000	0.	4.36	4.32	4.33	862.	56.	IL19SR, 18(16)ms from 20A(19C)
18	261	7109.	200.	0.0	0.0	U-L	0.0	-0.019	-30.	LI	0.000	0.	4.34	4.31	4.31	850.	60.	IL19SR, 18(17)ms from 20A(19C)
19	262	8830.	250.	0.0	0.0	U-L	0.0	-0.023	-31.	LI	0.000	0.	4.35	4.29	4.29	866.	61.	IL19SR, 22(20)ms from 20A(19C)
20	263	8570.	300.	0.0	0.0	U-L	0.0	-0.028	-32.	LI	0.000	0.	4.35	4.29	4.29	866.	61.	IL19SR, 20(25)ms from 20A(19C)
21	264	7486.	8.	0.0	0.0	U-L	0.0	-0.011	-29.	LI	0.000	0.	4.35	4.32	4.33	863.	67.	IL19SR, 22(10)ms from 20A(19C)
22	265	7442.	0.	0.0	0.0	U-L	0.0	-0.012	-29.	UI	0.000	0.	4.36	4.32	4.33	859.	77.	IU19SR, 5(10)ms from Rsp1(19C)
23	266	7657.	0.	0.0	0.0	U-L	0.0	-0.010	-29.	UI	0.000	0.	4.21	4.18	4.18	752.	73.	IU19SR, 4(10)ms from Rsp1(19C)

----- QSUMMARY V03.14 -----

FORMAT:

Q#	File	I-m	Idot	I-t	Idot	QDC	MIITs	t-Q	V-max	Coil	t(H)	V(H)	T(t)	T(m)	T(b)	P	LL	Location
A5,	I5,	F8.0,F5.0,F5.1,F5.1,				A5,F5.1,	F8.3,	F8.0,	A4,	F8.3,F5.0,F5.2,F5.2,F5.2,F5.0,F5.0,2X,A30								

NOTATION KEY

Q# Quench number or Spot heater number (e.g. s4 is spot heater 4)
 File Quench file number
 I-m Main coil current at quench
 Idot Main coil dI/dt at quench
 I-t Trim coil current at quench
 Idot Trim coil dI/dt at quench
 QDC Name of quench detection circuit which tripped:
 1) U-L Upper - Lower Coil
 2) V-dI Magnet - Idot
 3) SC L SC Pwr Leads - Idot
 4) Vtot Magnet
 5) Trim Trim Coil
 6) Cu L Cu Pwr Leads - IR
 7) GndI Ground Fault Monitor
 8) Thru Through Bus - Idot
 MII's Integral of $(I^2)dt$ from t-Q to "infinity"
 t-Q Time first voltage appears in V(Upper) - V(Lower) (relative to quench detection time)
 V-max Maximum voltage across any quarter coil
 Coil Coil corresponding to V-max
 t(H) Protection heater firing time (relative to quench detection time); -.999 if heater did not fire
 V(H) Protection heater firing voltage; -.999. if heater did not fire
 T(t) Temperature at top of magnet
 T(m) Temperature at middle of magnet
 T(b) Temperature at bottom of magnet
 P Dewar pressure (Torr)
 LL Liquid level (%)
 Location Quench or spot heat

Distribution:

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